REMARKS

The Examiner rejected claims 1-4, 11, 16, and 18-20 pursuant to 35 U.S.C. §103(a) as unpatentable over a combination of Kawaguchi, et al. (US 5,677,501) and Yoshiya (JP 02-161934). Claims 13-15 were rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over the combination of Kawaguchi, et al., Yoshiya, and Mo, et al. (US 6,733,455). Claims 5-10 were allowed. Claims 12, 17, and 21 were objected to as allowable if amended into independent form. Applicants respectfully request reconsideration of the rejections of claims 1-4, 11, 13-16, and 18-20, including independent claims 1, 11, and 20.

Independent claim 1 has been amended for clarity rather than patentability. Claim 1 recites determining a rate of change of a parameter as a function of a difference in time between first and second images associated with different times, the first and second images representing a scanned region of a patient; calculating a positional change in the parameter between the first and second images associated with different times, the positional change being displayed as a function the rate of change and being a function of the difference in time; and displaying the change in the parameter in the second image. Kawaguchi, et al. and Yoshiya do not disclose these limitations.

In particular, the Examiner cites Kawaguchi, et al. for disclosure of determining a rate of change of a parameter as a function of a difference in time between first and second images associated with different times. However, Kawaguchi, et al. do not disclose this limitation. Kawaguchi, et al. provide a flow display to replace a bar graph or numerical values (col. 1, lines 6-20). The magnitude and polarity of flow are detected from an input signal indicative of a physical quantity (col. 5, lines 2-4 and 17-28). The magnitude is a difference between a reference value and the input signal (col. 5, lines 24-28). A small area display (col. 1, lines 61-65) includes a plurality (e.g., 12) of fixed display segments (Figure 2; and col. 5, lines 41-45). The rate of shift of lighting each display element and the direction of travel of the shift indicates the magnitude and polarity of flow (col. 6, lines 18-52). Kawaguchi, et al. use an input signal to then generate a sequence of images representing the flow indicated by the input signal. The flow is determined, and then the images are

generated to represent the flow. Kawaguchi, et al. do not determine as a function of a difference in time between images.

Kawaguchi, et al. calculate a difference between a current input signal and a reference value (col. 5, lines 24-28), and change the output image based on the magnitude and polarity. However, Kawaguchi, et al. do not calculate a positional change in the parameter between images. The output images are the end result. The images change based on the input, but a positional change in the parameter between images is not calculated.

Yoshiya, et al. determine velocities for each of a sequence of images (page 4, 2nd to last paragraph). Acceleration between pairs of velocity images is determined (page 4, last paragraph and page 5, 5th and 6th paragraphs). The acceleration is displayed as a gray stripe in a color flow map (page 5, 6th paragraph). By determining acceleration between different pairs of images, a sequence of acceleration images may be generated (page 6, 2nd-4th paragraphs). Yoshiya, et al. determine acceleration for each image independently of acceleration for a previous image. Yoshiya, et al. do not calculate a positional change in the parameter between images.

Kawaguchi, et al. would not have been combined with Yoshiya, et al. to enhance flexibility. Kawaguchi, et al. rely on changing direction and/or changing speed of shift through adjacent fixed display elements to communicate flow. Yoshiya, et al. display a contour that varies in size, shape, and position (see Figures 4a and 4b). These two display techniques would interfere with each other, so would not be used together.

Independent claim 11 has been amended to include the limitations of dependent claim 17. Dependent claim 17 was indicated as allowable and there are no intervening claims. Accordingly, claim 11 is allowable.

Independent claim 20 recites a processor operable to generate an at least partially persistent pattern in each of at least two images representing a region of a patient, the persistent pattern shifted, in a second of the images as compared to a first of the images, as a function of flow direction, flow magnitude or combinations thereof in the first of the images, the processor operable to calculate a second pattern in the second of the images as a function of a first pattern in the first of images.

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The Examiner cites Kawaguchi, et al. for this limitation, but does not disclose the limitation. Kawaguchi, et al. shift their three bar pattern (See Figure 3) at a speed based on the magnitude of the input flow and in a direction based on the polarity of the input flow. Kawaguchi, et al. do not determine any shift using previous images, but instead have a mapped pattern to shift based on the input signal. The pattern is not shifted as a function of flow information in a first of the images.

Dependent claims 2-4, 13-16, 18-19, and 21 depend from one of the independent claims above, so are allowable for the same reasons. Further limitations may patentably distinguish from the cited references, but are not further addressed herein for brevity.

CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call Craig Summerfield at (312) 321-4726.

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